0954084-090400

FIG. 1

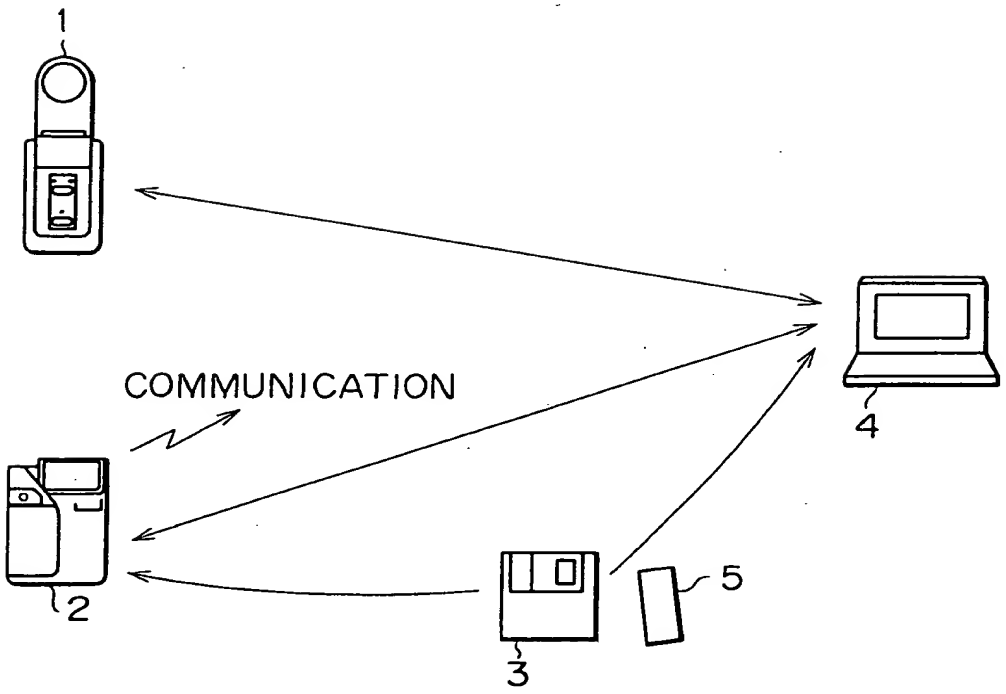

FIG. 2

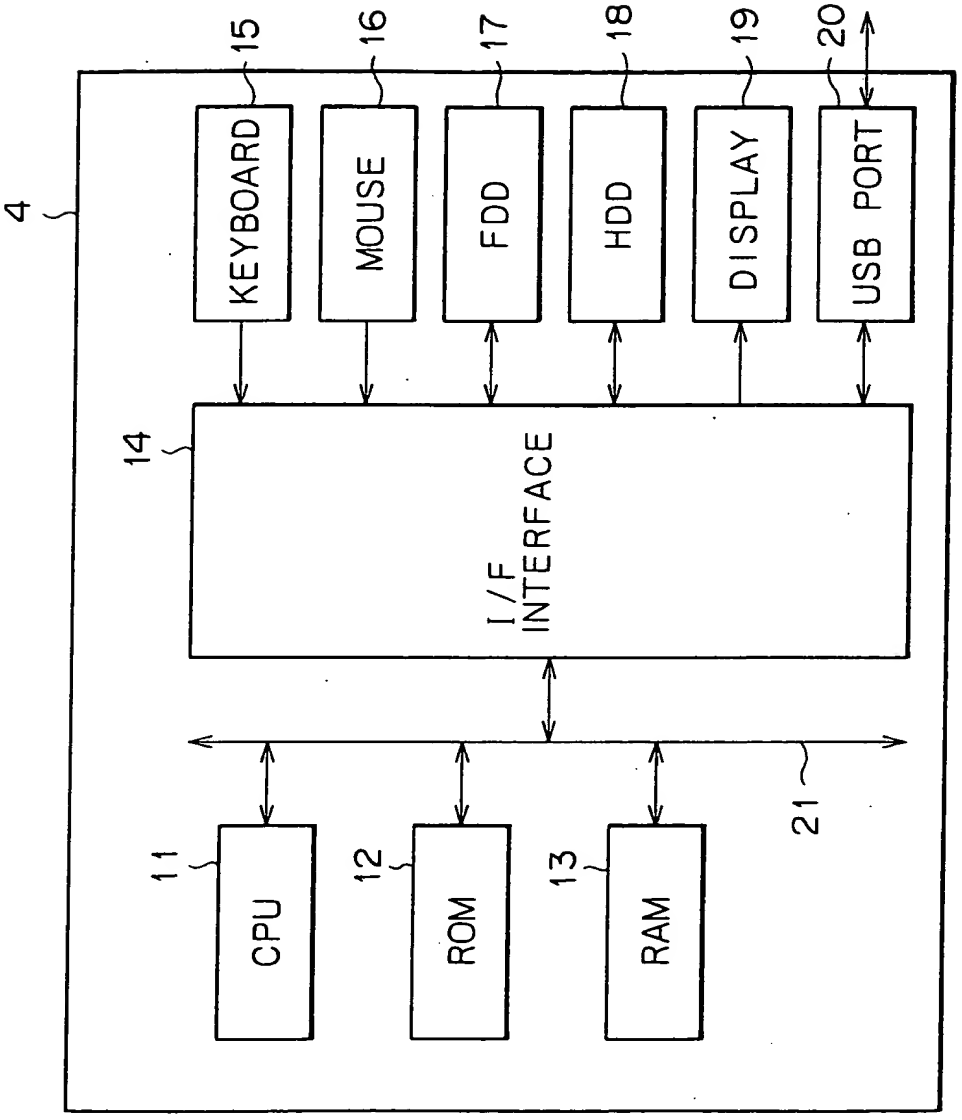
4
KEYBOARD
15
MOUSE
16
FDD
17
HDD
18
DISPLAY
19
USB PORT
20
14
I/F INTERFACE
CPU
11
ROM
12
RAM
13
21

FIG. 3A

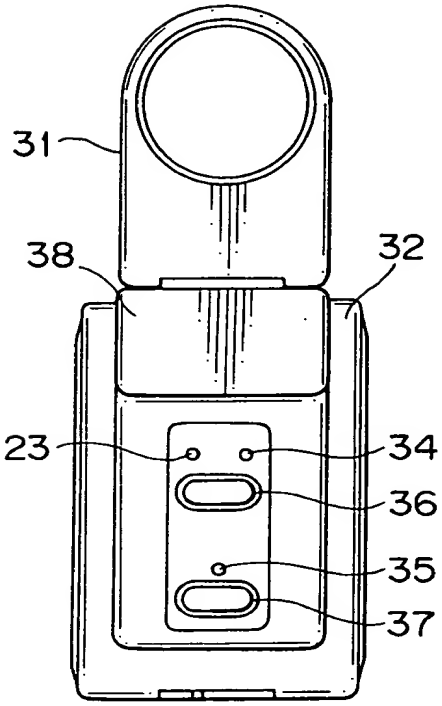

FIG. 3C

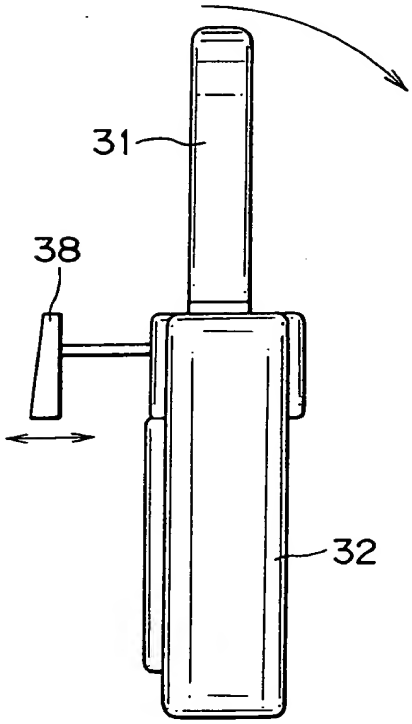

FIG. 3B

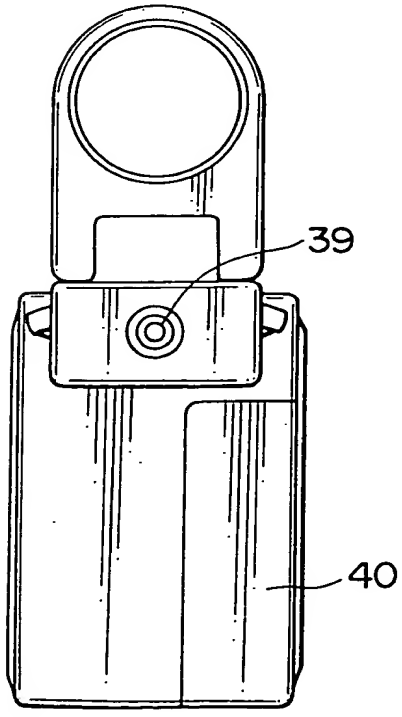

FIG. 3D

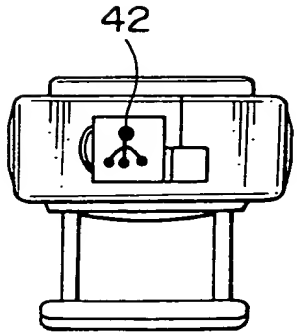

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FIG. 4

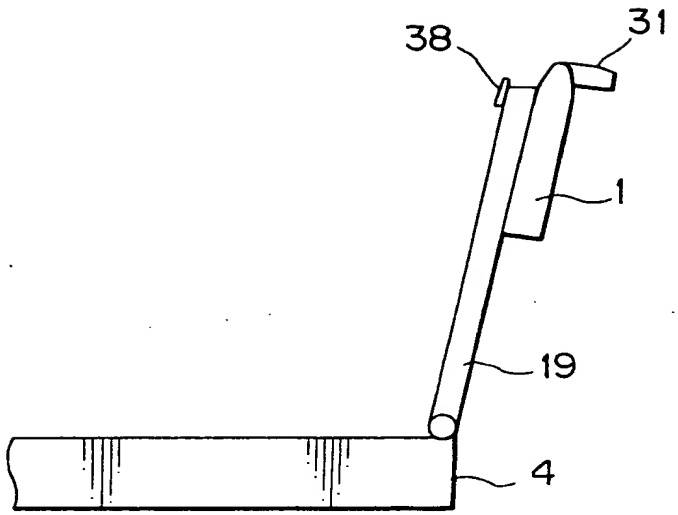


FIG. 5

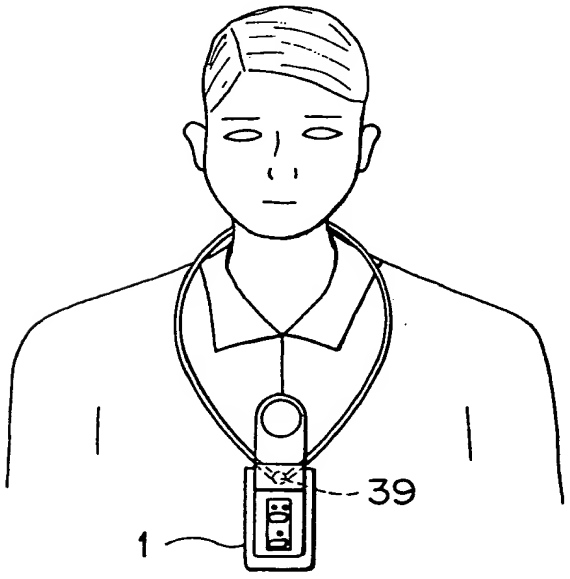


FIG. 6

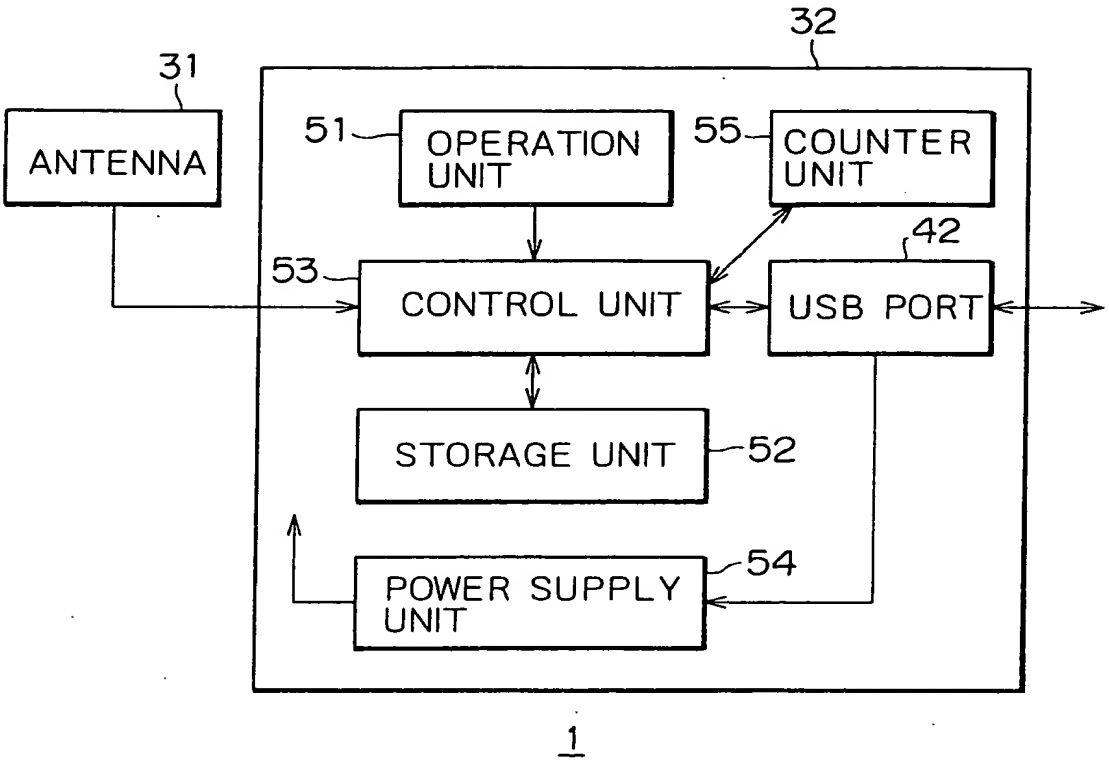

32
31
ANTENNA
51
OPERATION UNIT
55
COUNTER UNIT
42
53
CONTROL UNIT
USB PORT
STORAGE UNIT
52
54
POWER SUPPLY UNIT
1

FIG. 7

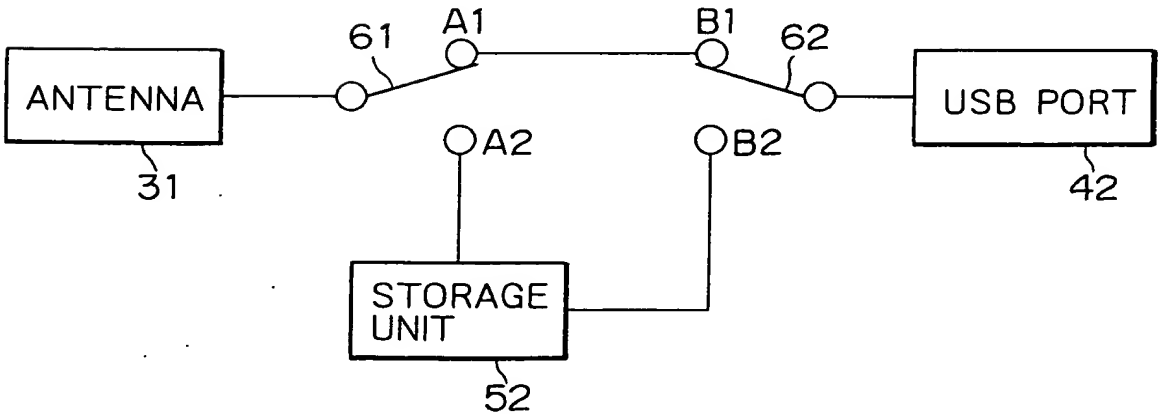

61
A1
B1
62
ANTENNA
USB PORT
A2
B2
31
42
STORAGE UNIT
52

FIG.8

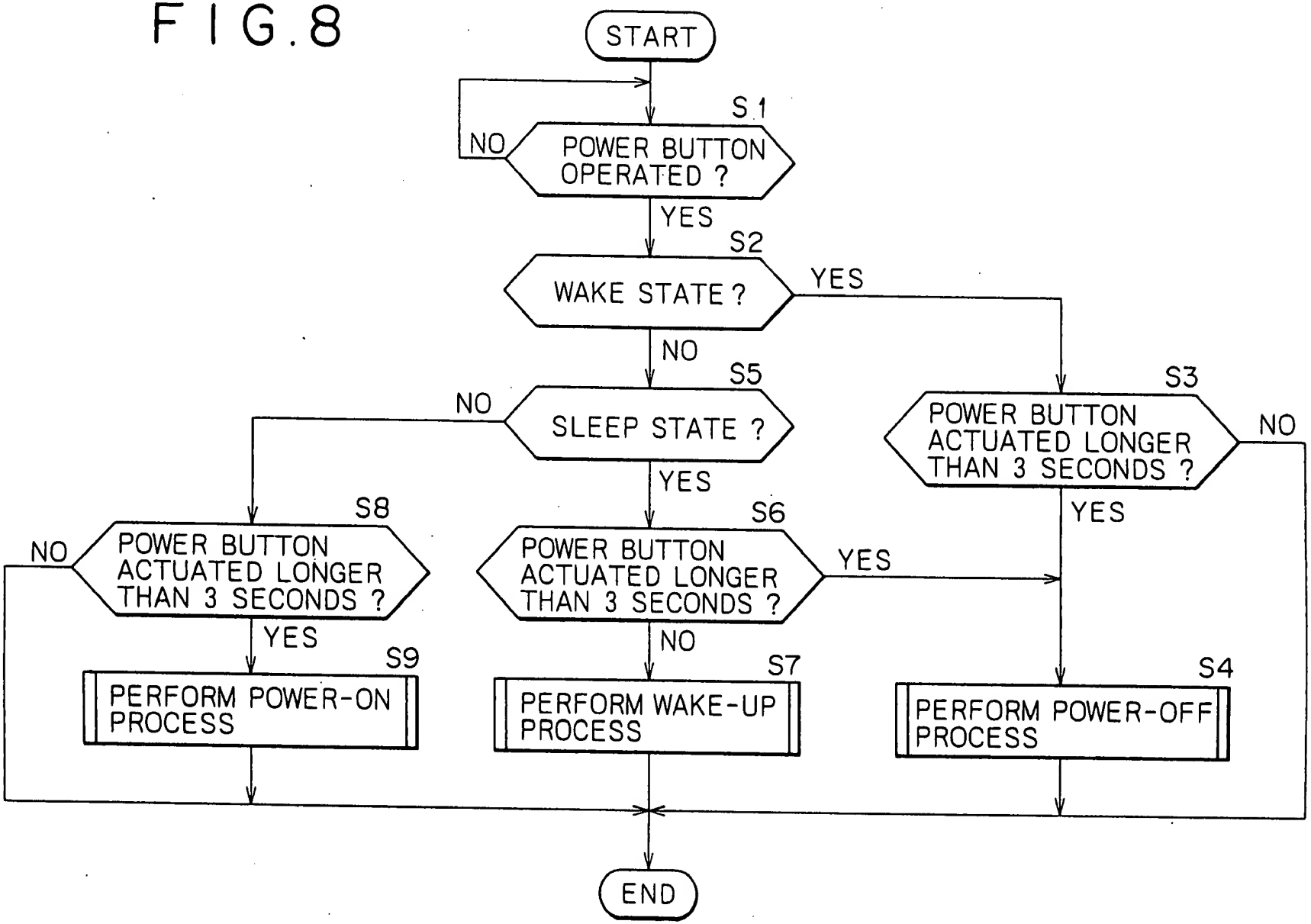

START
S1
NO
POWER BUTTON OPERATED ?
YES
S2
WAKE STATE ?
YES
NO
S5
NO
SLEEP STATE ?
YES
S3
POWER BUTTON ACTUATED LONGER THAN 3 SECONDS ?
NO
YES
S8
NO
POWER BUTTON ACTUATED LONGER THAN 3 SECONDS ?
YES
S9
PERFORM POWER-ON PROCESS
S6
POWER BUTTON ACTUATED LONGER THAN 3 SECONDS ?
YES
NO
S7
PERFORM WAKE-UP PROCESS
S4
PERFORM POWER-OFF PROCESS
END

FIG. 9

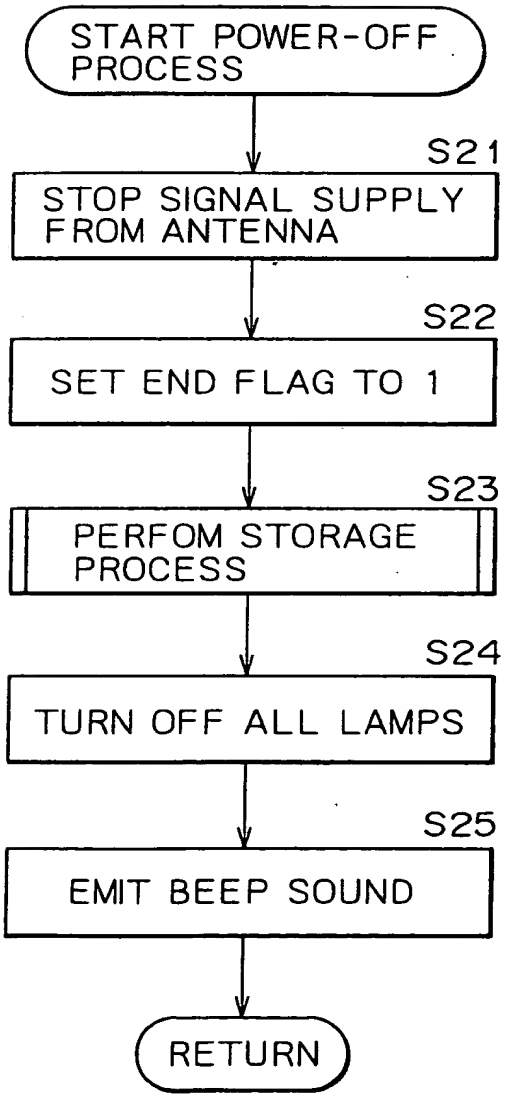
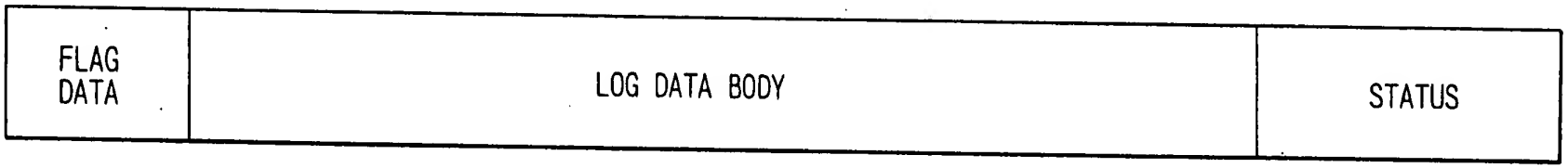
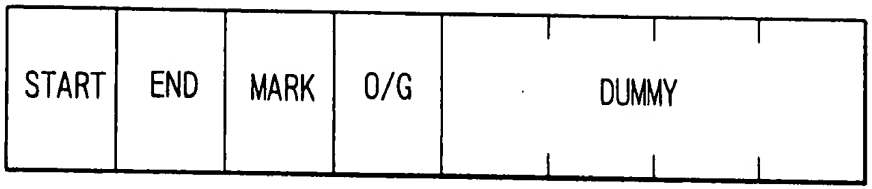

START POWER-OFF PROCESS
S21
STOP SIGNAL SUPPLY FROM ANTENNA
S22
SET END FLAG TO 1
S23
PERFOM STORAGE PROCESS
S24
TURN OFF ALL LAMPS
S25
EMIT BEEP SOUND
RETURN

FIG.10A



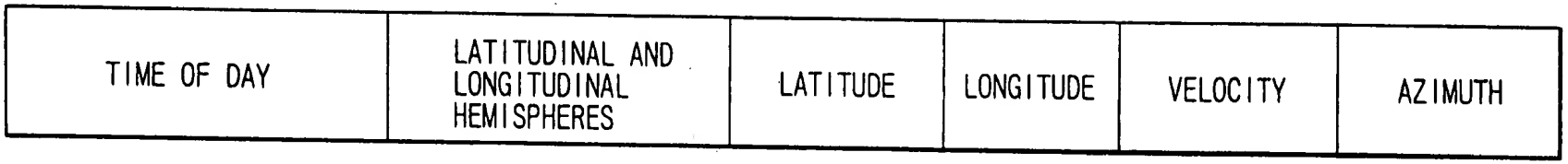
LOG DATA

FIG.10B



FLAG DATA

FIG.10C



LOG DATA BODY

FIG. 11

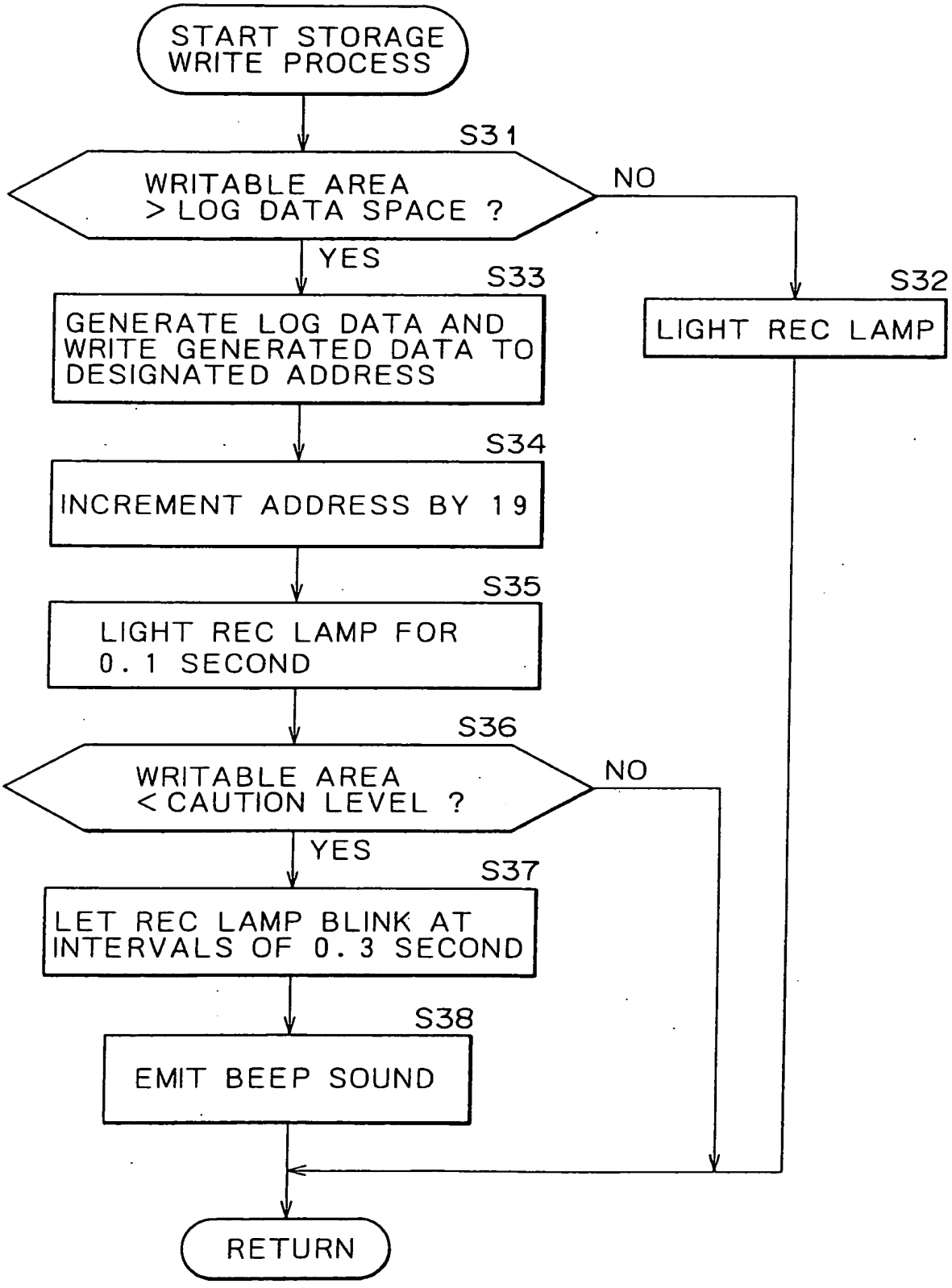

START STORAGE WRITE PROCESS
S31
WRITABLE AREA > LOG DATA SPACE ?
NO
YES
S33
GENERATE LOG DATA AND WRITE GENERATED DATA TO DESIGNATED ADDRESS
S32
LIGHT REC LAMP
S34
INCREMENT ADDRESS BY 19
S35
LIGHT REC LAMP FOR 0.1 SECOND
S36
WRITABLE AREA < CAUTION LEVEL ?
NO
YES
S37
LET REC LAMP BLINK AT INTERVALS OF 0.3 SECOND
S38
EMIT BEEP SOUND
RETURN

FIG. 12

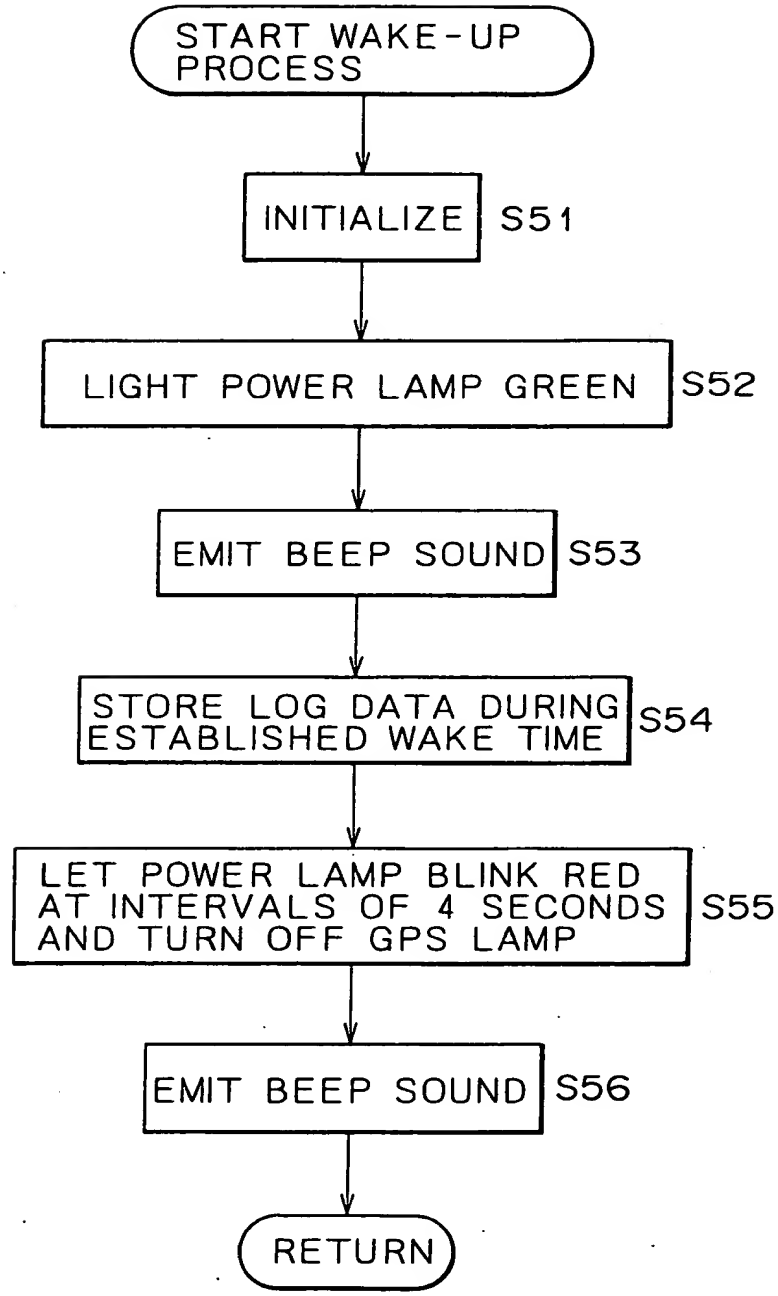

START WAKE-UP PROCESS
INITIALIZE
S51
LIGHT POWER LAMP GREEN
S52
EMIT BEEP SOUND
S53
STORE LOG DATA DURING ESTABLISHED WAKE TIME
S54
LET POWER LAMP BLINK RED AT INTERVALS OF 4 SECONDS AND TURN OFF GPS LAMP
S55
EMIT BEEP SOUND
S56
RETURN

FIG. 13

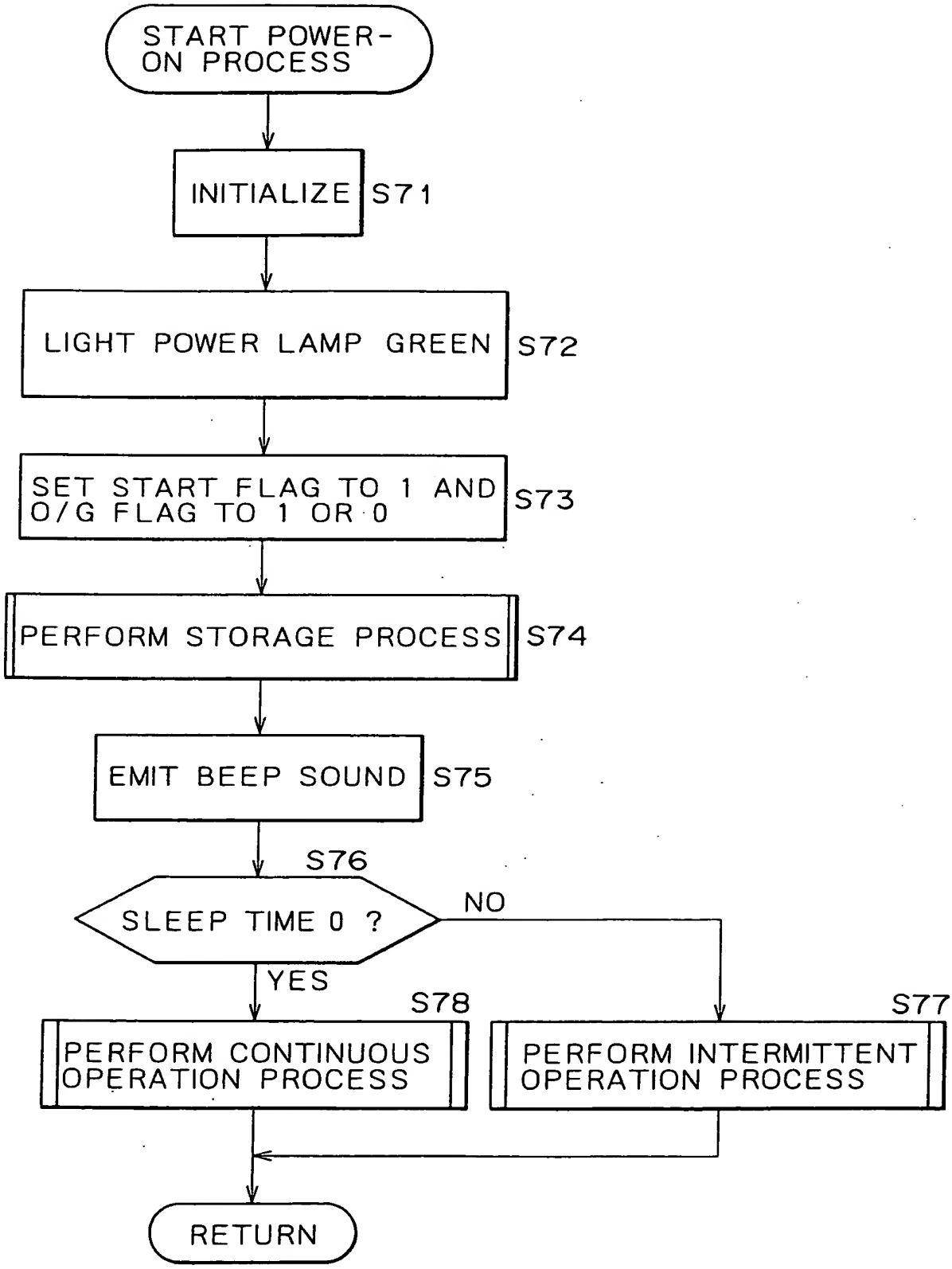

START POWER-ON PROCESS
INITIALIZE
S71
LIGHT POWER LAMP GREEN
S72
SET START FLAG TO 1 AND O/G FLAG TO 1 OR 0
S73
PERFORM STORAGE PROCESS
S74
EMIT BEEP SOUND
S75
S76
SLEEP TIME 0 ?
NO
YES
S78
PERFORM CONTINUOUS OPERATION PROCESS
S77
PERFORM INTERMITTENT OPERATION PROCESS
RETURN

FIG.14

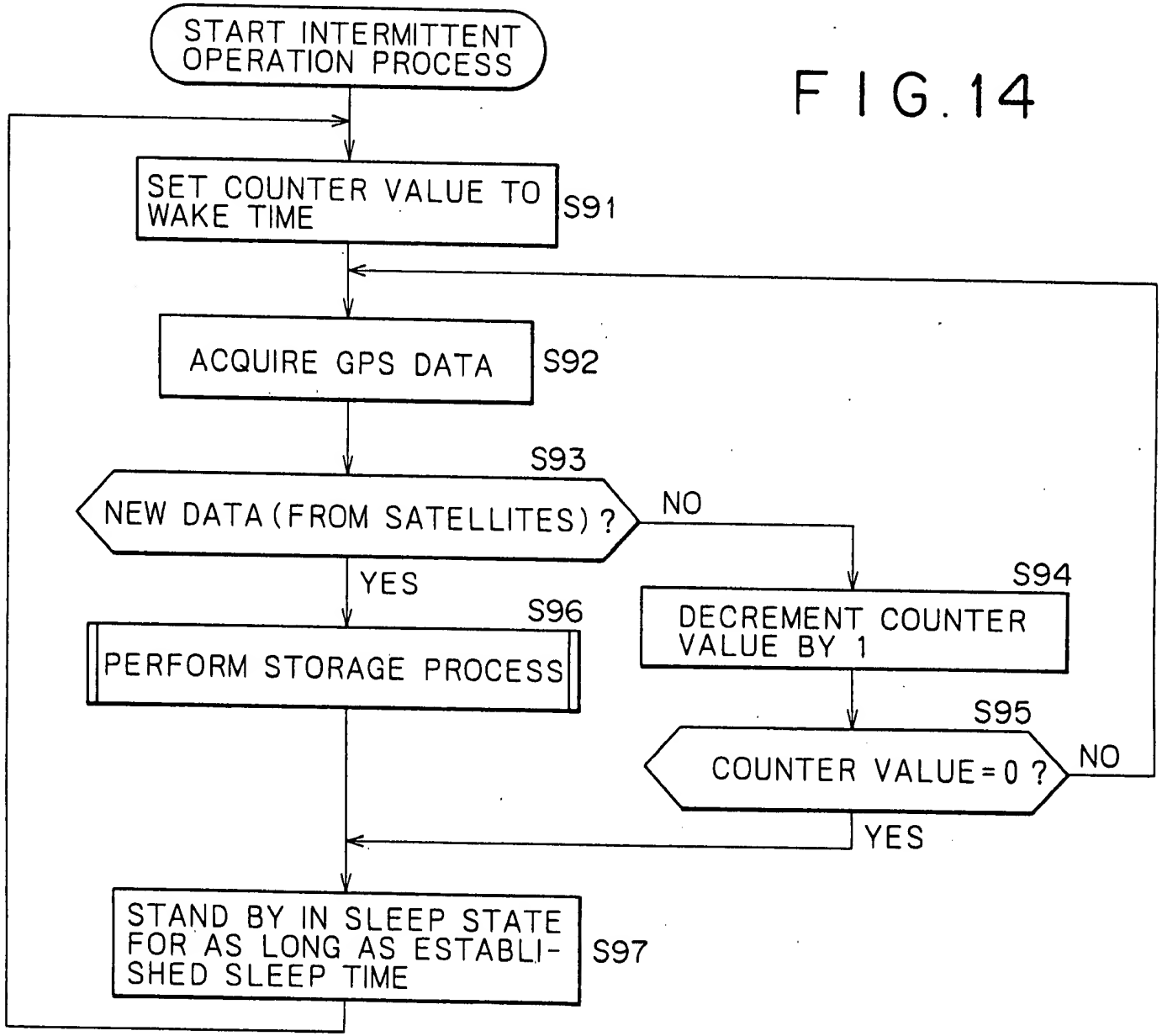

START INTERMITTENT OPERATION PROCESS
SET COUNTER VALUE TO WAKE TIME
S91
ACQUIRE GPS DATA
S92
S93
NEW DATA (FROM SATELLITES) ?
NO
YES
S94
DECREMENT COUNTER VALUE BY 1
S95
COUNTER VALUE = 0 ?
NO
YES
S96
PERFORM STORAGE PROCESS
STAND BY IN SLEEP STATE FOR AS LONG AS ESTABLISHED SLEEP TIME
S97

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FIG.15

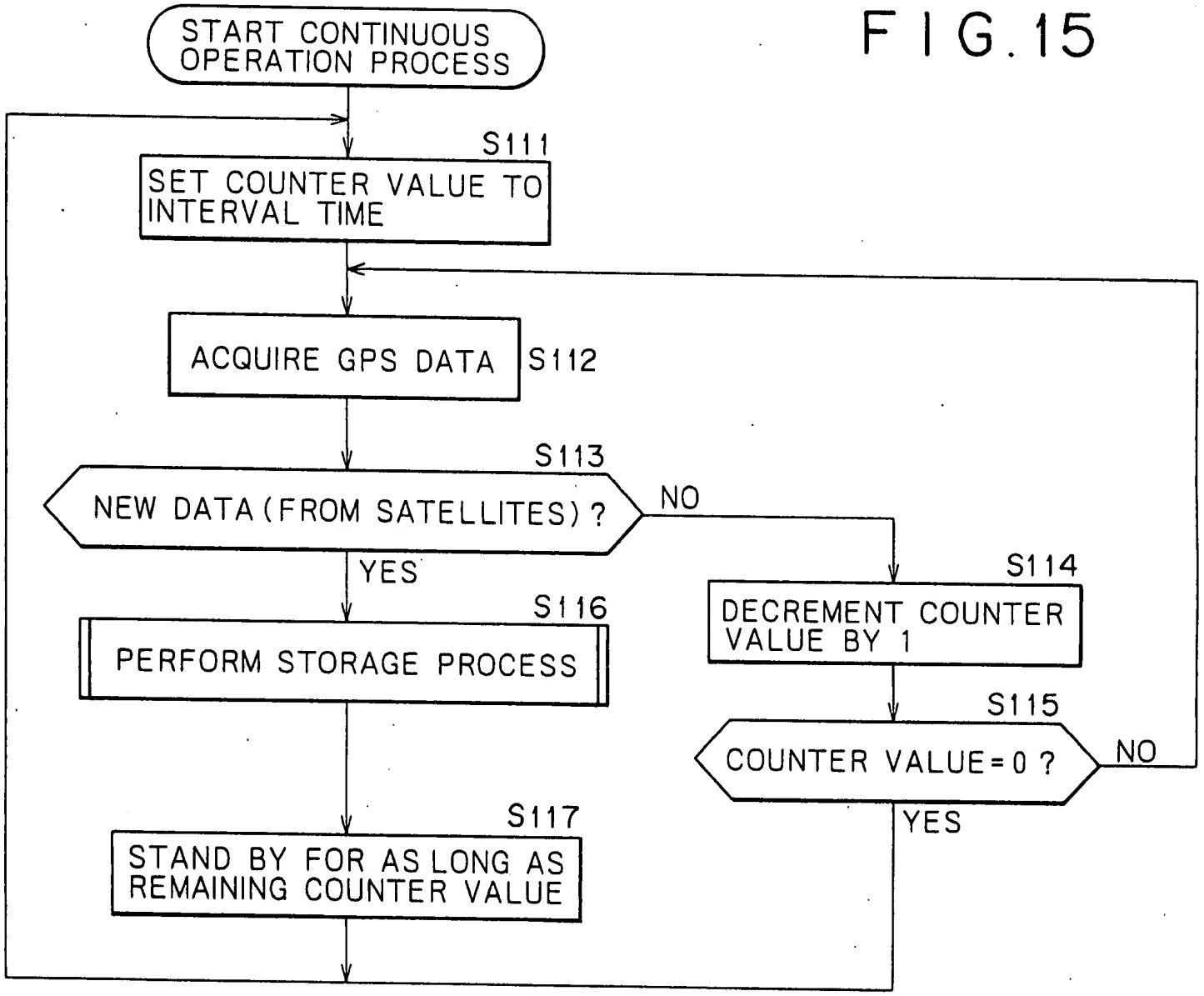

FIG.16

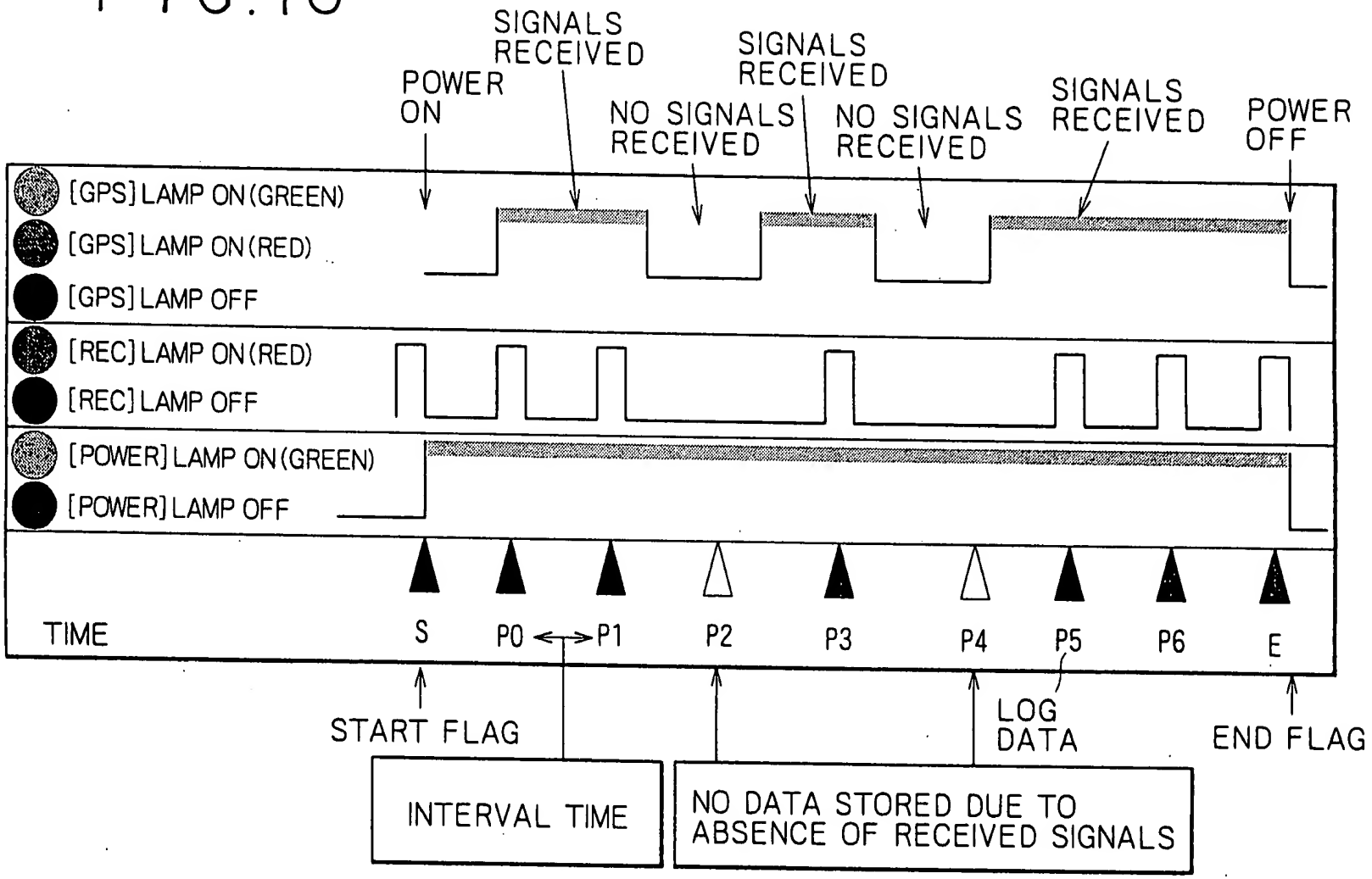
POWER ON
SIGNALS RECEIVED
NO SIGNALS RECEIVED
SIGNALS RECEIVED
NO SIGNALS RECEIVED
SIGNALS RECEIVED
POWER OFF
[GPS] LAMP ON (GREEN)
[GPS] LAMP ON (RED)
[GPS] LAMP OFF
[REC] LAMP ON (RED)
[REC] LAMP OFF
[POWER] LAMP ON (GREEN)
[POWER] LAMP OFF
TIME
S
P0
P1
P2
P3
P4
P5
P6
E
START FLAG
LOG DATA
END FLAG
INTERVAL TIME
NO DATA STORED DUE TO ABSENCE OF RECEIVED SIGNALS

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FIG.17

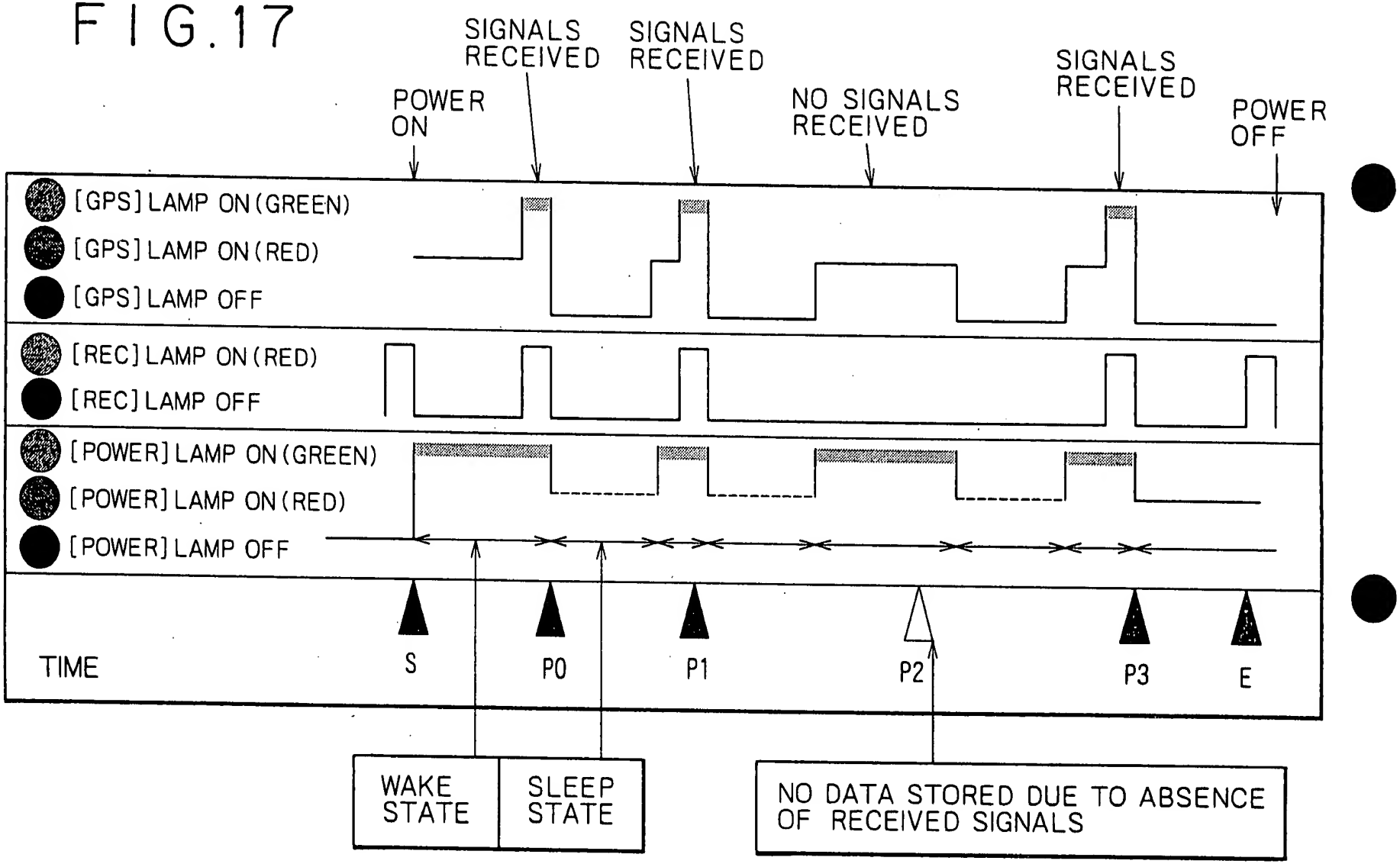


FIG.18

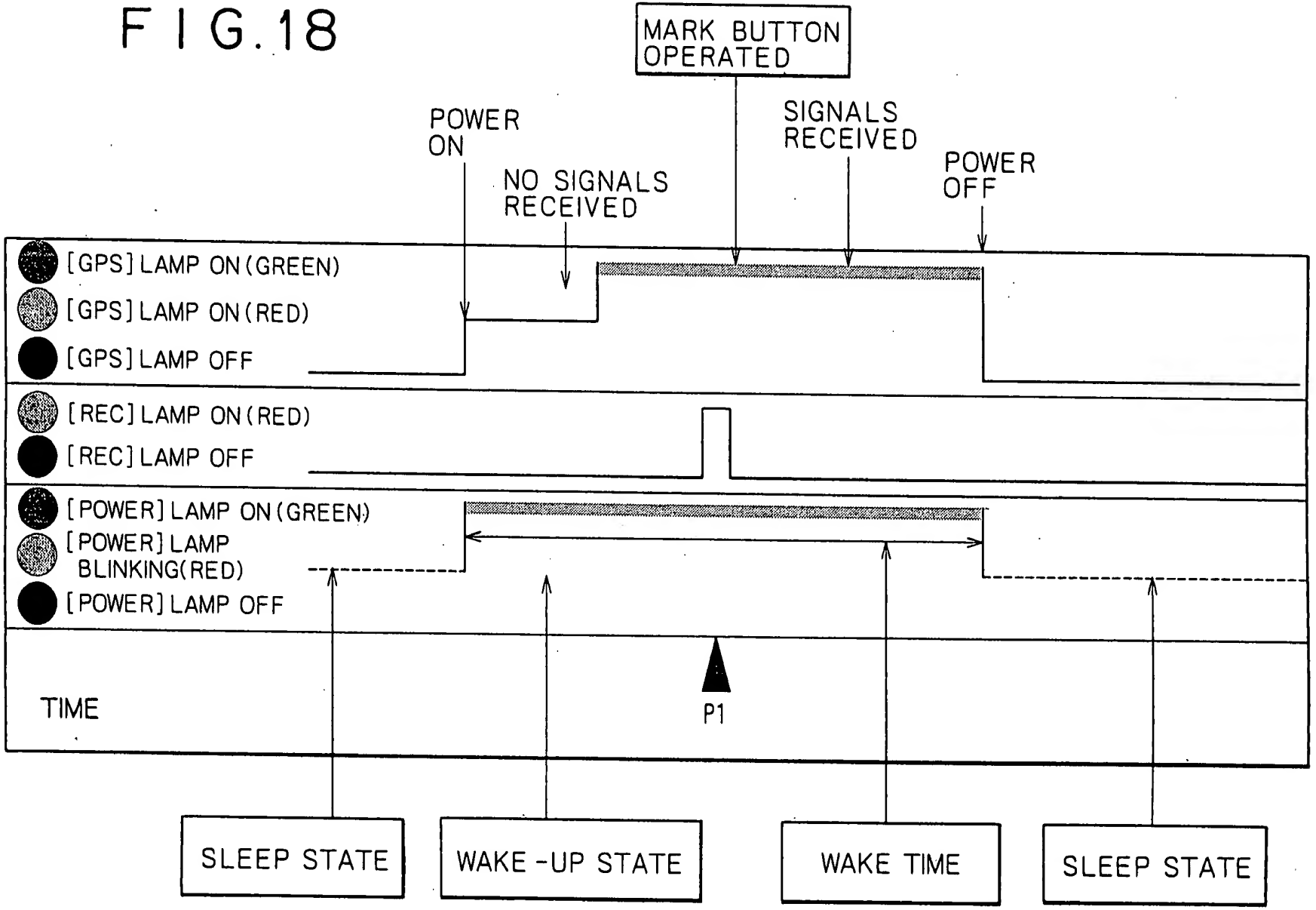

MARK BUTTON OPERATED
POWER ON
NO SIGNALS RECEIVED
SIGNALS RECEIVED
POWER OFF
[GPS] LAMP ON (GREEN)
[GPS] LAMP ON (RED)
[GPS] LAMP OFF
[REC] LAMP ON (RED)
[REC] LAMP OFF
[POWER] LAMP ON (GREEN)
[POWER] LAMP BLINKING (RED)
[POWER] LAMP OFF
TIME
P1
SLEEP STATE
WAKE-UP STATE
WAKE TIME
SLEEP STATE

FIG. 19

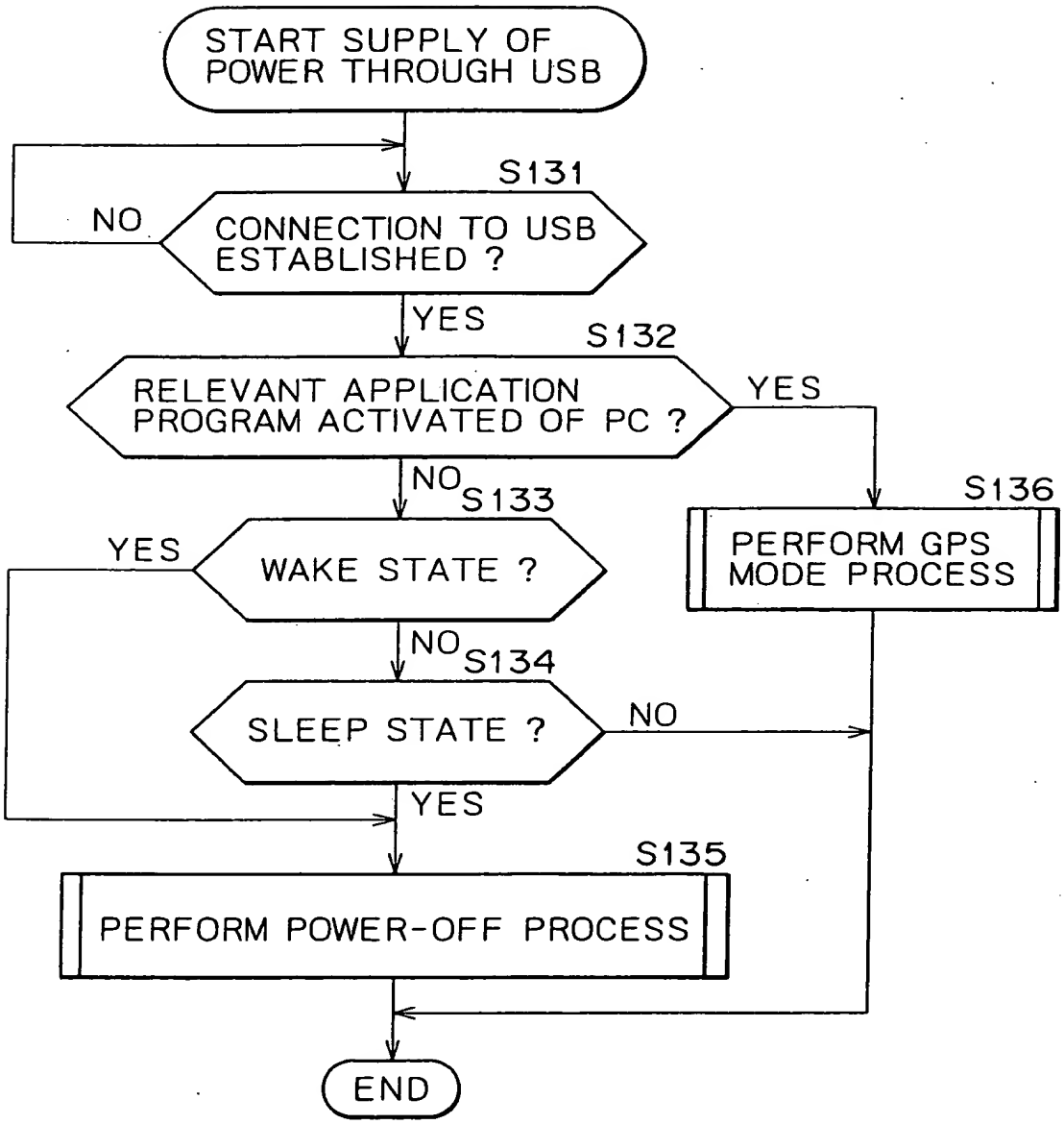

START SUPPLY OF POWER THROUGH USB
S131
NO
CONNECTION TO USB ESTABLISHED ?
YES
S132
RELEVANT APPLICATION PROGRAM ACTIVATED OF PC ?
YES
NO
S133
S136
YES
WAKE STATE ?
PERFORM GPS MODE PROCESS
NO
S134
SLEEP STATE ?
NO
YES
S135
PERFORM POWER-OFF PROCESS
END

FIG. 20

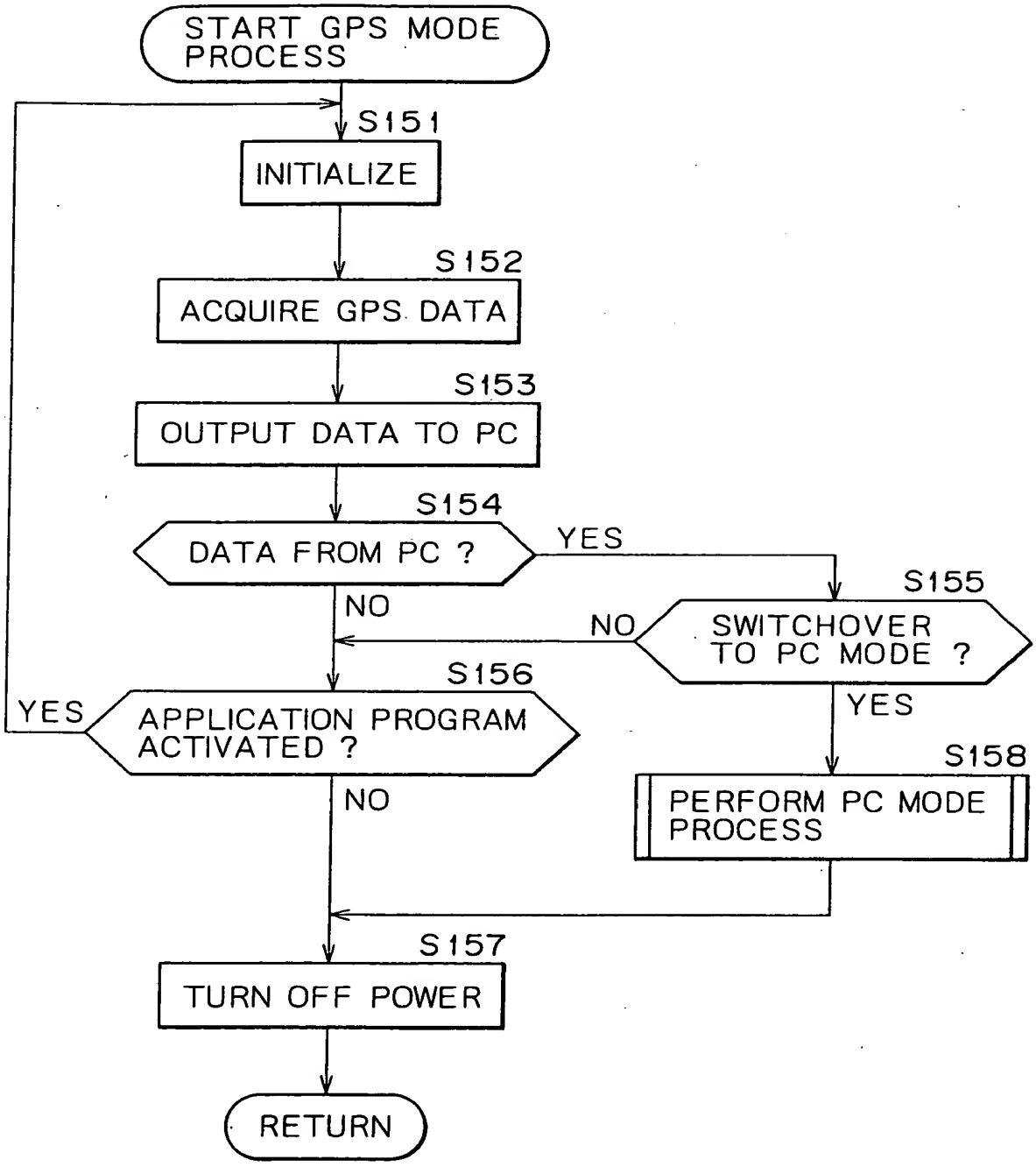

START GPS MODE PROCESS
S151
INITIALIZE
S152
ACQUIRE GPS DATA
S153
OUTPUT DATA TO PC
S154
DATA FROM PC ?
YES
NO
S155
SWITCHOVER TO PC MODE ?
NO
YES
S156
APPLICATION PROGRAM ACTIVATED ?
YES
NO
S158
PERFORM PC MODE PROCESS
S157
TURN OFF POWER
RETURN

FIG. 21

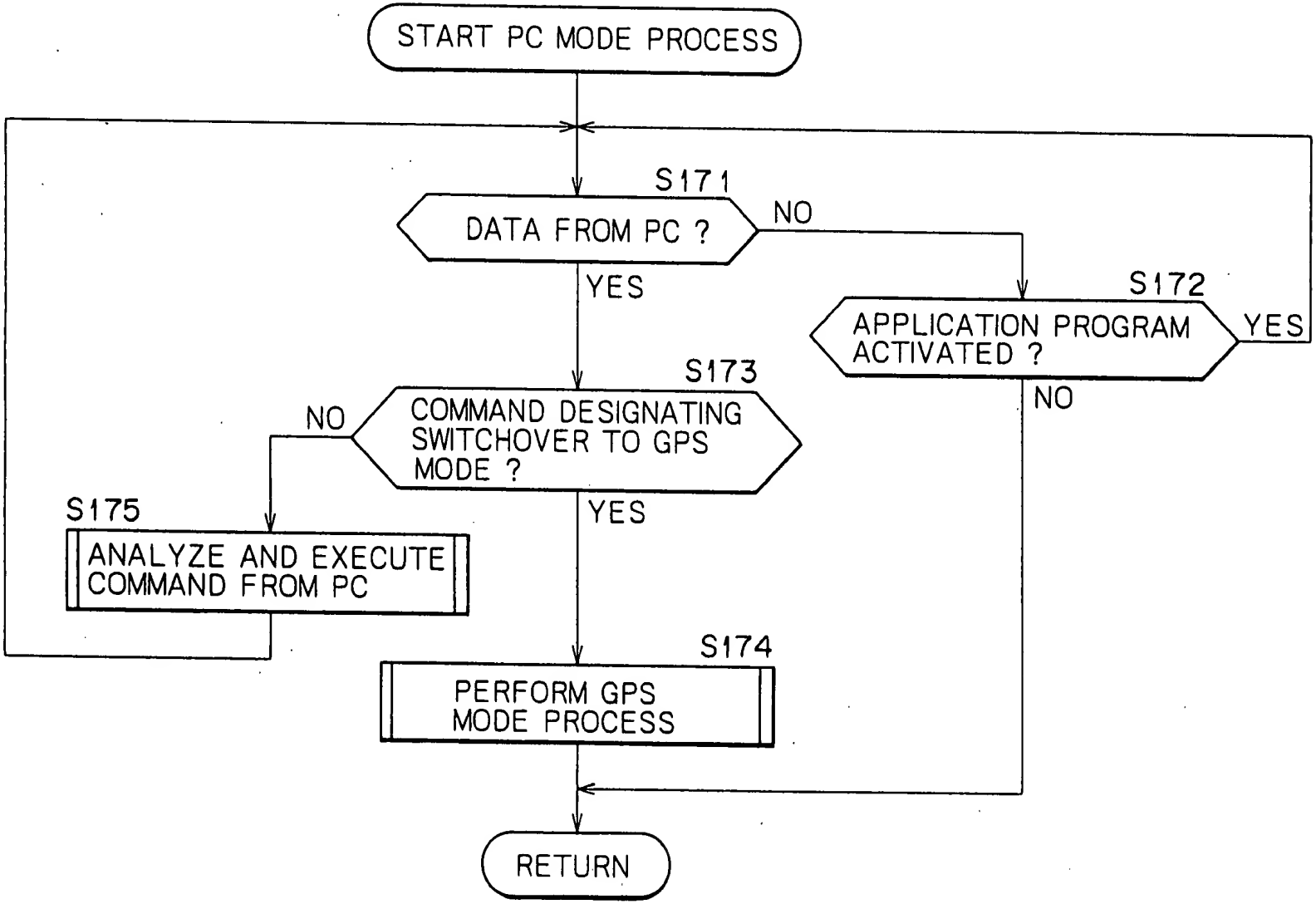

START PC MODE PROCESS
S171
DATA FROM PC ?
NO
YES
S172
APPLICATION PROGRAM ACTIVATED ?
YES
NO
S173
COMMAND DESIGNATING SWITCHOVER TO GPS MODE ?
NO
YES
S175
ANALYZE AND EXECUTE COMMAND FROM PC
S174
PERFORM GPS MODE PROCESS
RETURN

FIG. 22

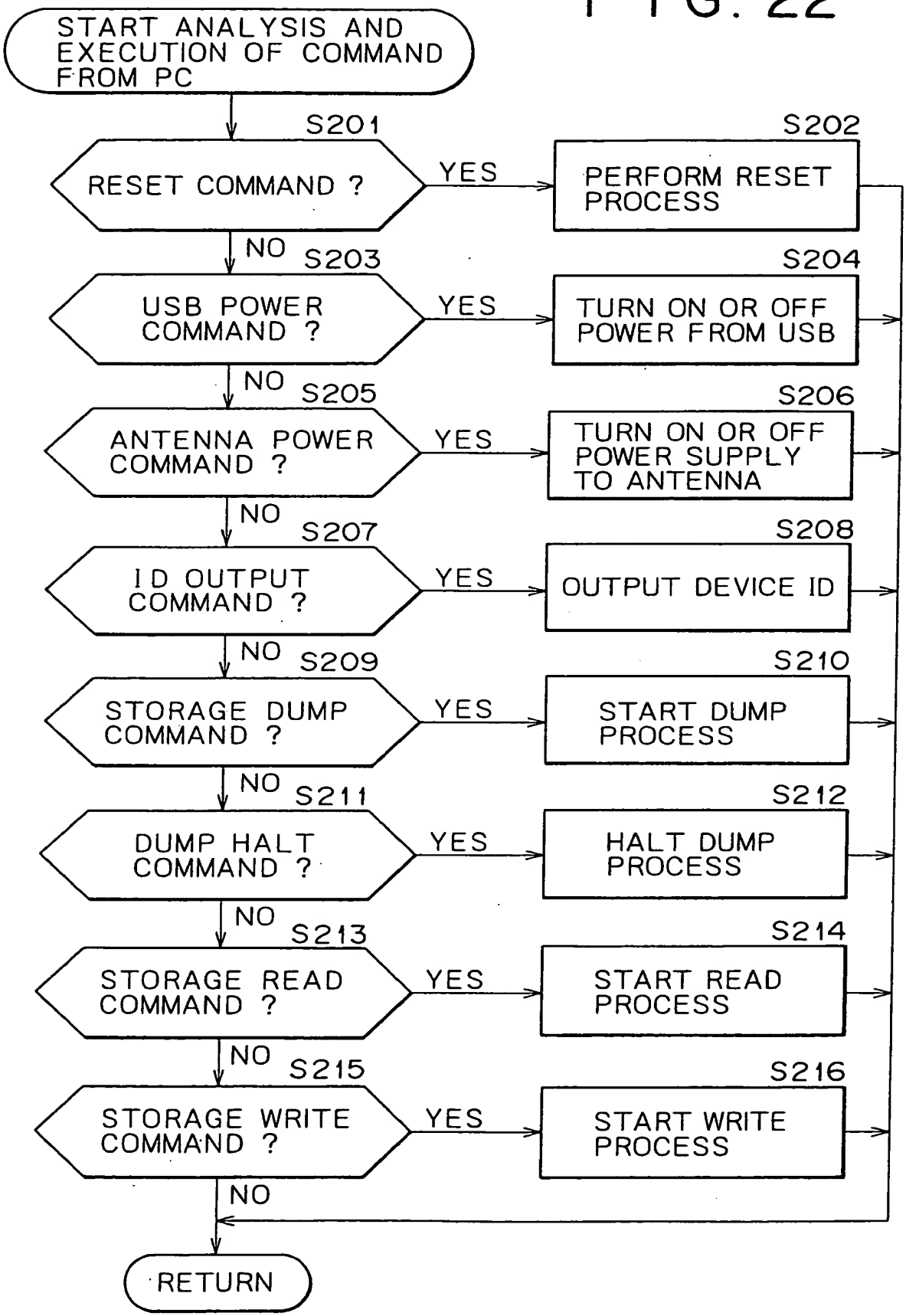

START ANALYSIS AND EXECUTION OF COMMAND FROM PC
S201
RESET COMMAND ?
YES
S202
PERFORM RESET PROCESS
NO
S203
USB POWER COMMAND ?
YES
S204
TURN ON OR OFF POWER FROM USB
NO
S205
ANTENNA POWER COMMAND ?
YES
S206
TURN ON OR OFF POWER SUPPLY TO ANTENNA
NO
S207
ID OUTPUT COMMAND ?
YES
S208
OUTPUT DEVICE ID
NO
S209
STORAGE DUMP COMMAND ?
YES
S210
START DUMP PROCESS
NO
S211
DUMP HALT COMMAND ?
YES
S212
HALT DUMP PROCESS
NO
S213
STORAGE READ COMMAND ?
YES
S214
START READ PROCESS
NO
S215
STORAGE WRITE COMMAND ?
YES
S216
START WRITE PROCESS
NO
RETURN

FIG. 23

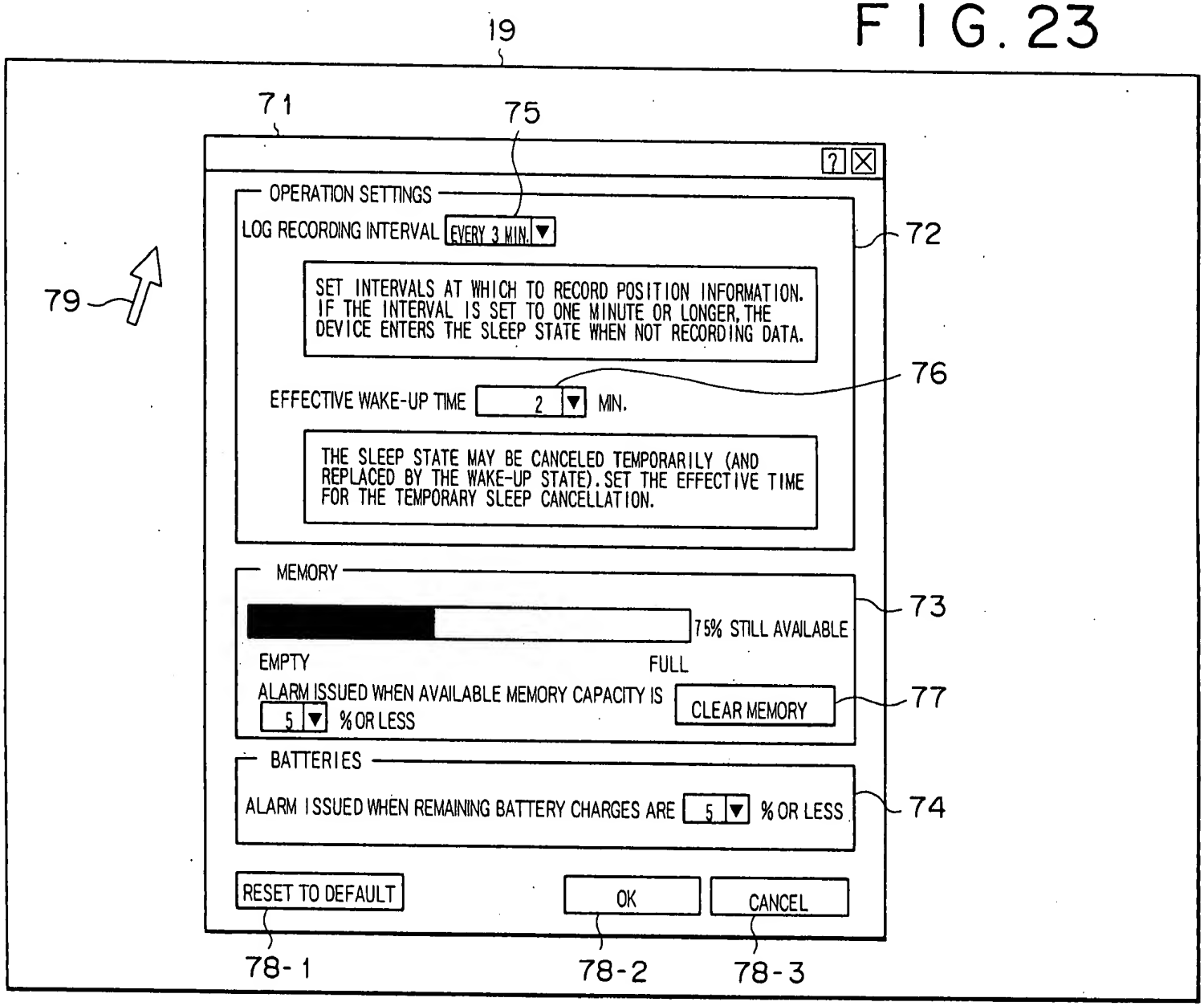

19
71
75
OPERATION SETTINGS
LOG RECORDING INTERVAL
EVERY 3 MIN.
72
79
SET INTERVALS AT WHICH TO RECORD POSITION INFORMATION. IF THE INTERVAL IS SET TO ONE MINUTE OR LONGER, THE DEVICE ENTERS THE SLEEP STATE WHEN NOT RECORDING DATA.
76
EFFECTIVE WAKE-UP TIME
2
MIN.
THE SLEEP STATE MAY BE CANCELED TEMPORARILY (AND REPLACED BY THE WAKE-UP STATE). SET THE EFFECTIVE TIME FOR THE TEMPORARY SLEEP CANCELLATION.
MEMORY
73
75% STILL AVAILABLE
EMPTY
FULL
ALARM ISSUED WHEN AVAILABLE MEMORY CAPACITY IS
5
% OR LESS
CLEAR MEMORY
77
BATTERIES
ALARM ISSUED WHEN REMAINING BATTERY CHARGES ARE
5
% OR LESS
74
RESET TO DEFAULT
OK
CANCEL
78-1
78-2
78-3

FIG. 24

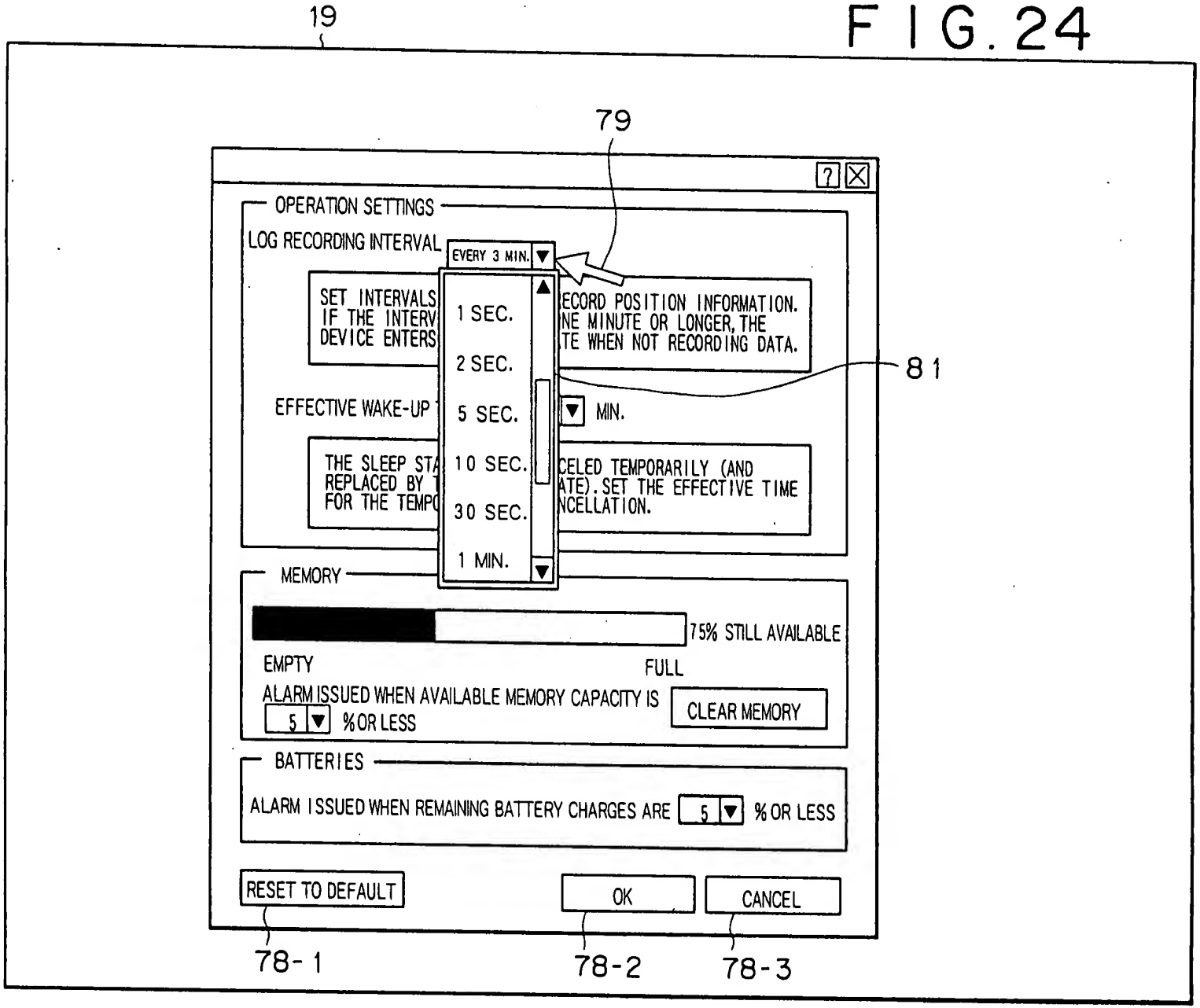

19
79
OPERATION SETTINGS
LOG RECORDING INTERVAL
EVERY 3 MIN.
1 SEC.
2 SEC.
5 SEC.
10 SEC.
30 SEC.
1 MIN.
81
MIN.
MEMORY
75% STILL AVAILABLE
EMPTY
FULL
ALARM ISSUED WHEN AVAILABLE MEMORY CAPACITY IS
5
%OR LESS
CLEAR MEMORY
BATTERIES
ALARM ISSUED WHEN REMAINING BATTERY CHARGES ARE
5
%OR LESS
RESET TO DEFAULT
OK
CANCEL
78-1
78-2
78-3

FIG. 25

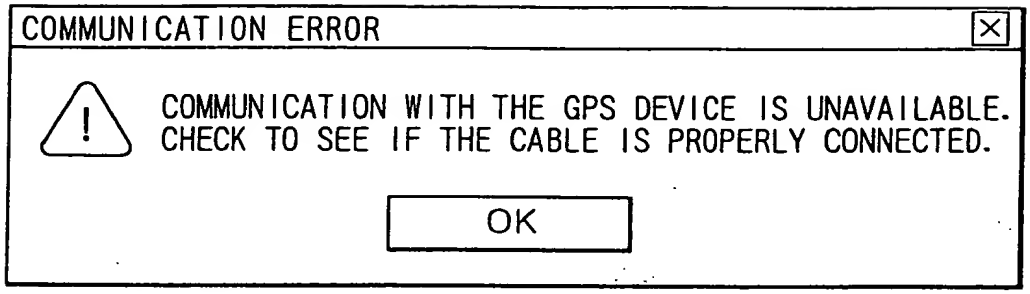

COMMUNICATION ERROR
COMMUNICATION WITH THE GPS DEVICE IS UNAVAILABLE.
CHECK TO SEE IF THE CABLE IS PROPERLY CONNECTED.
OK

FIG. 26

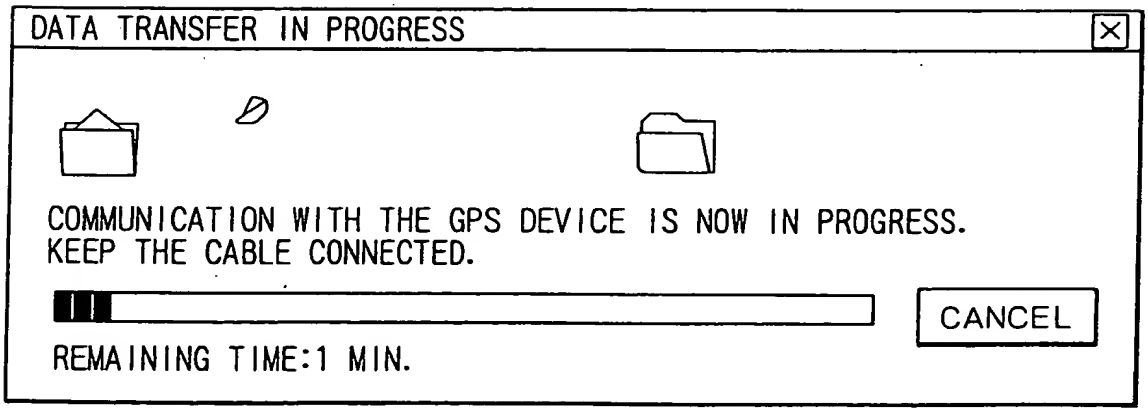
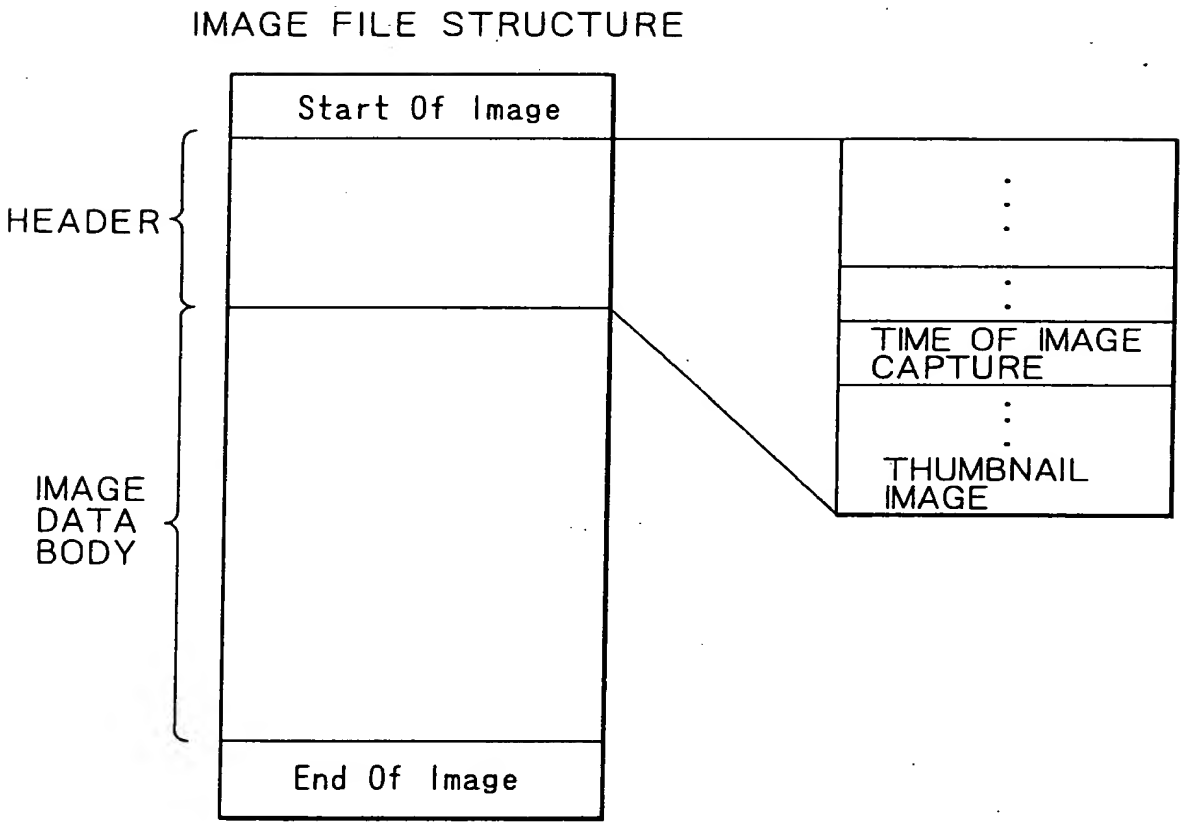

DATA TRANSFER IN PROGRESS
COMMUNICATION WITH THE GPS DEVICE IS NOW IN PROGRESS.
KEEP THE CABLE CONNECTED.
CANCEL
REMAINING TIME:1 MIN.

FIG. 27



FILE OF IMAGE CAPTURED BY DIGITAL CAMERA

FIG. 28

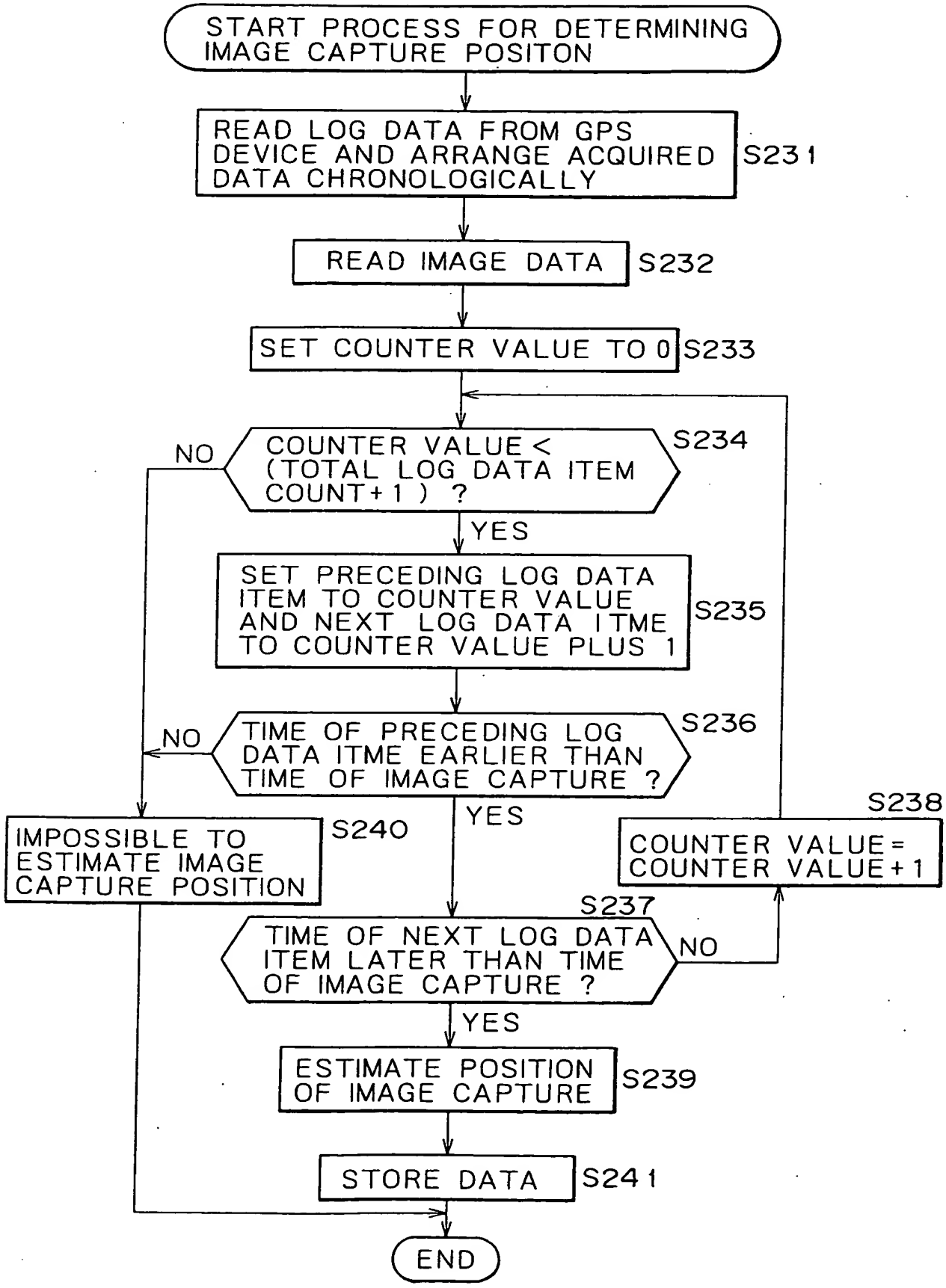

START PROCESS FOR DETERMINING IMAGE CAPTURE POSITON
READ LOG DATA FROM GPS DEVICE AND ARRANGE ACQUIRED DATA CHRONOLOGICALLY
S231
READ IMAGE DATA
S232
SET COUNTER VALUE TO 0
S233
COUNTER VALUE < (TOTAL LOG DATA ITEM COUNT+1) ?
S234
NO
YES
SET PRECEDING LOG DATA ITEM TO COUNTER VALUE AND NEXT LOG DATA ITME TO COUNTER VALUE PLUS 1
S235
TIME OF PRECEDING LOG DATA ITME EARLIER THAN TIME OF IMAGE CAPTURE ?
S236
NO
YES
IMPOSSIBLE TO ESTIMATE IMAGE CAPTURE POSITION
S240
S238
COUNTER VALUE = COUNTER VALUE+1
S237
TIME OF NEXT LOG DATA ITEM LATER THAN TIME OF IMAGE CAPTURE ?
NO
YES
ESTIMATE POSITION OF IMAGE CAPTURE
S239
STORE DATA
S241
END

FIG. 29

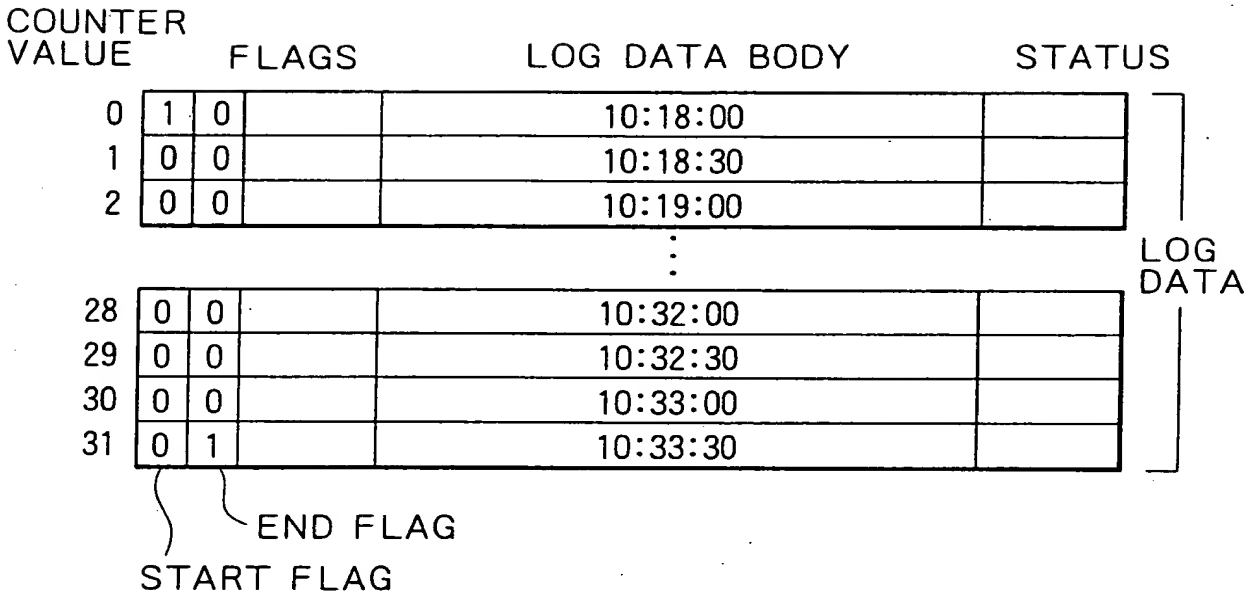

COUNTER VALUE
FLAGS
LOG DATA BODY
STATUS
0
1
0
10:18:00
1
0
0
10:18:30
2
0
0
10:19:00
28
0
0
10:32:00
29
0
0
10:32:30
30
0
0
10:33:00
31
0
1
10:33:30
LOG DATA
END FLAG
START FLAG

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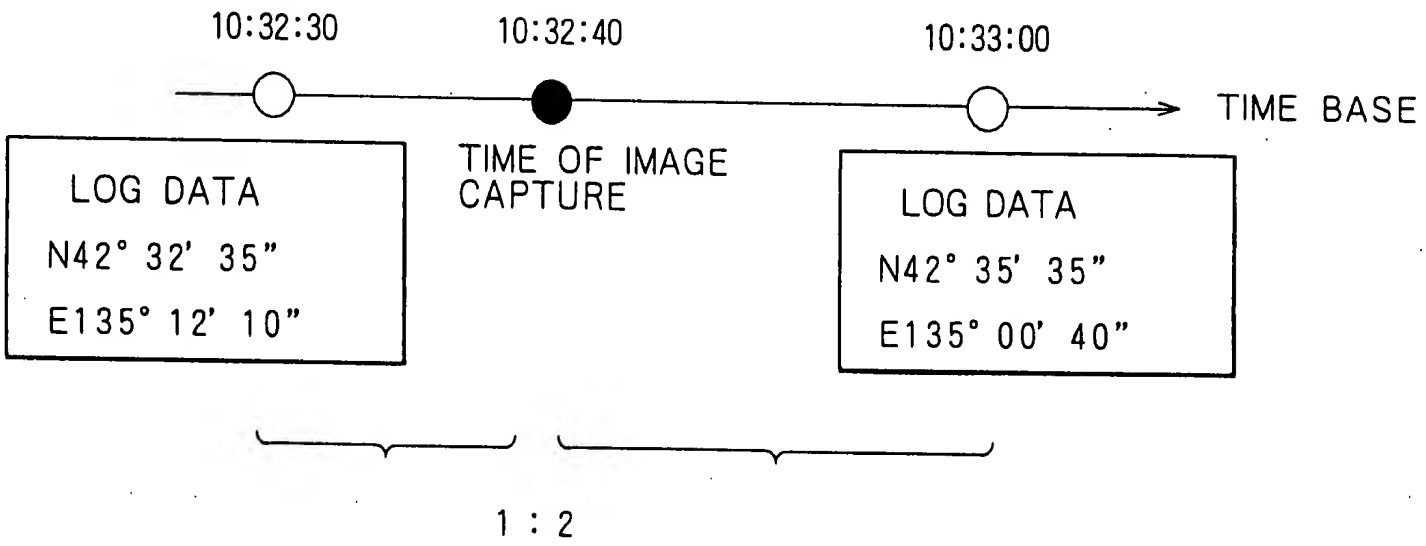
FIG. 30



00T60" h66T960

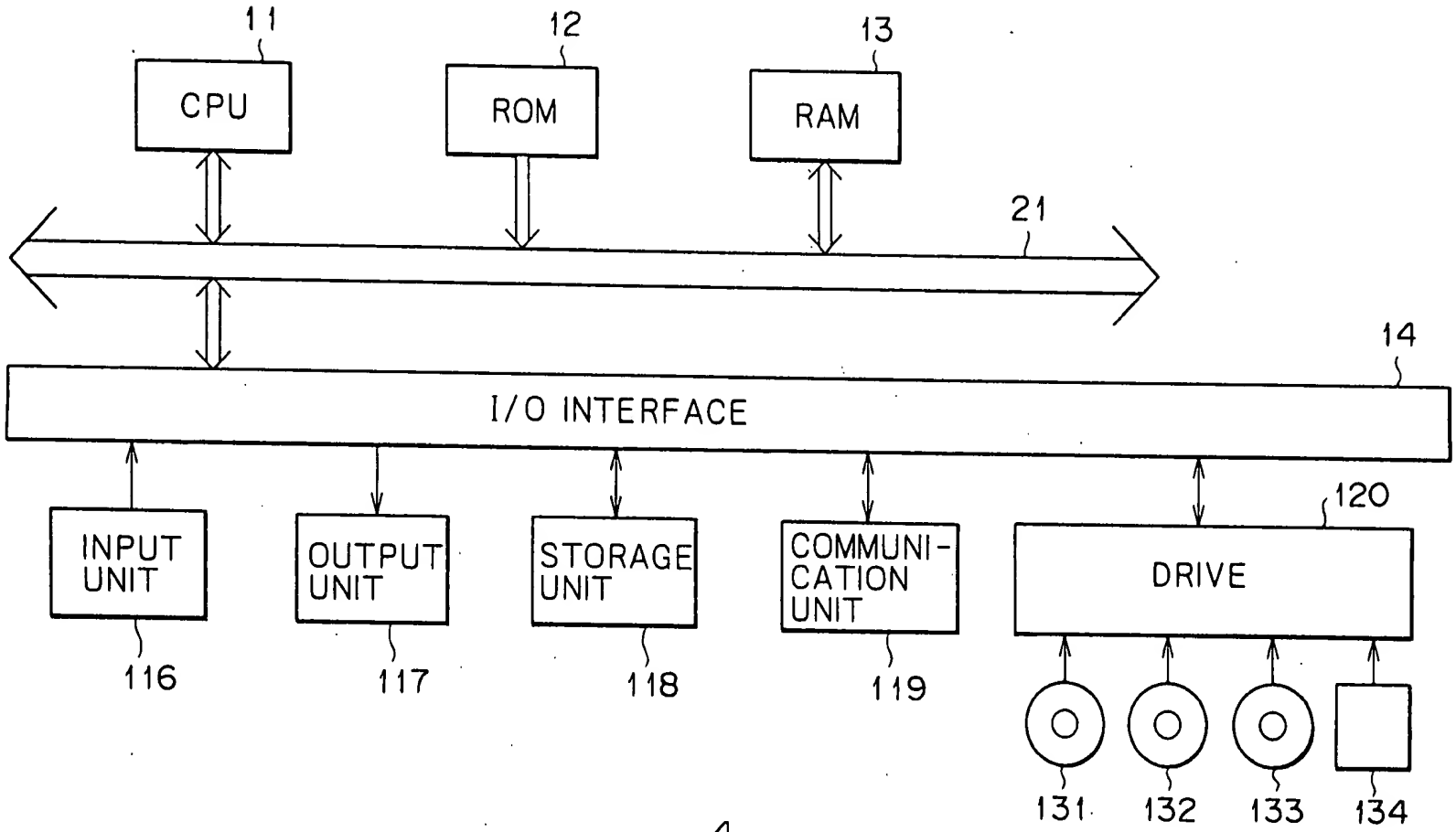



FIG. 31